PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

BC hydro

BRITISH COLUMBIA

Aerial Boat Counts on 17 Northern Lakes of British Columbia, 2002

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This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

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105-02286/

INTRODUCTION

Aerial boat counts are carried out in British Columbia as part of the Small Lakes Index Management (SLIM) program. This program entails the monitoring of many different variables relating to the management of fresh water fishing activities throughout the province. These variables include: conducting angler interviews, obtaining fish size and age, determining fish growth, gathering catch-per-unit-effort (CPUE), and conducting aerial boat counts. The aerial boat count program is designed to develop and monitor a standard index of angler activity by capturing "instantaneous boat counts" at a single time strata (midday on weekends) throughout the summer (ice-off) angling season (Tredger 1991). In 1989, the SLIM boat count program covered approximately 400 lakes and conducted creel surveys on 15 lakes (Tredger 1990). Flight patterns, dates, and times are standardized to allow for consistent comparisons across regions and years.

The Peace/Williston Fish and Wildlife Compensation Program (PWFWCP) conducted the same type of aerial boat count during the summer of 2002. Currently, the PWFWCP provides the funds to stock 8 lakes throughout the Williston watershed, located in north-central British Columbia. Although the management of these lakes is the responsibility of the Ministry of Water, Land and Air Protection (MWLAP), they are assessed by the PWFWCP every 4 to 5 years to ensure stocking program goals are met. The intent of the aerial boat count is a snap shot in time to be compared against other surveys in future years. No creel surveys were conducted in conjunction with the aerial survey; therefore, information on fish age, size and growth for each of these lakes was not collected.

The purpose of this aerial boat count was to obtain a better understanding of angler use on stocked lakes within the Williston watershed. The survey is an "instantaneous count" of anglers. The boat count data can provide an estimate of absolute summer angler effort on each chosen lake. This method of determining angler effort is only one of the tools used by management to evaluate small lake fisheries. The PWFWCP works on 8 specific lakes within the Williston drainage. An evaluation plan is now required to define the management goals for these lakes. This 2002 aerial boat count report will help contribute information needed to further develop a more formal management plan for these stocked lakes and ensure the goals of the stocking program are being met.

METHODS

Seventeen lakes were chosen to be surveyed for angler use over the summer of 2002. In addition to the 8 lakes stocked by the PWFWCP, 9 other lakes managed by MWLAP were surveyed. These lakes were in close proximity and the data gathered would aid in their future management.

The flight path was pre-determined and encompassed a 375 km round trip from Mackenzie B.C. (Figure 1). A Cessna 185 was used to count boats on the lake. The same route was flown each time and the lakes were counted in the same sequence at roughly the same time. Parkinson et al. (1988) found boat counts made at noon were not significantly different than those made at 1000 and 1600 hrs. The plane would leave the Mackenzie airport by 10:00 A.M. and start surveying the first lake. The flight was estimated to take between 2.0 and 2.5 hours to complete. Twenty flights were scheduled from May 5th to September 14th.

On each flight, the pilot recorded the number of boats engaged in fishing and the number of boats on shore. The pilot also recorded the type of boat used (canoe, aluminum, belly boat, etc). The number of people angling from shore was also noted. Additional information was collected on weather conditions, air temperature, campers present at the lake, and type of angling gear being used (spin cast versus fly fishing) when possible.

RESULTS

While the flight dates were pre-determined (Appendix 1), we had to cancel some flights due to ice on conditions. The first flight was scheduled for May 5. Conversations with the pilot on May 3 indicated that ice cover was still present on many Williston watershed lakes. As a result, the first flight was cancelled. It was reported that prior to the second scheduled flight (May 11) many of the lakes still may have ice on them. After much debate, it was deemed useful to conduct this second flight. One important piece of information gathered was the identification of general ice off dates (Table 1). In addition, some general angling use could be determined from old ice fishing holes.

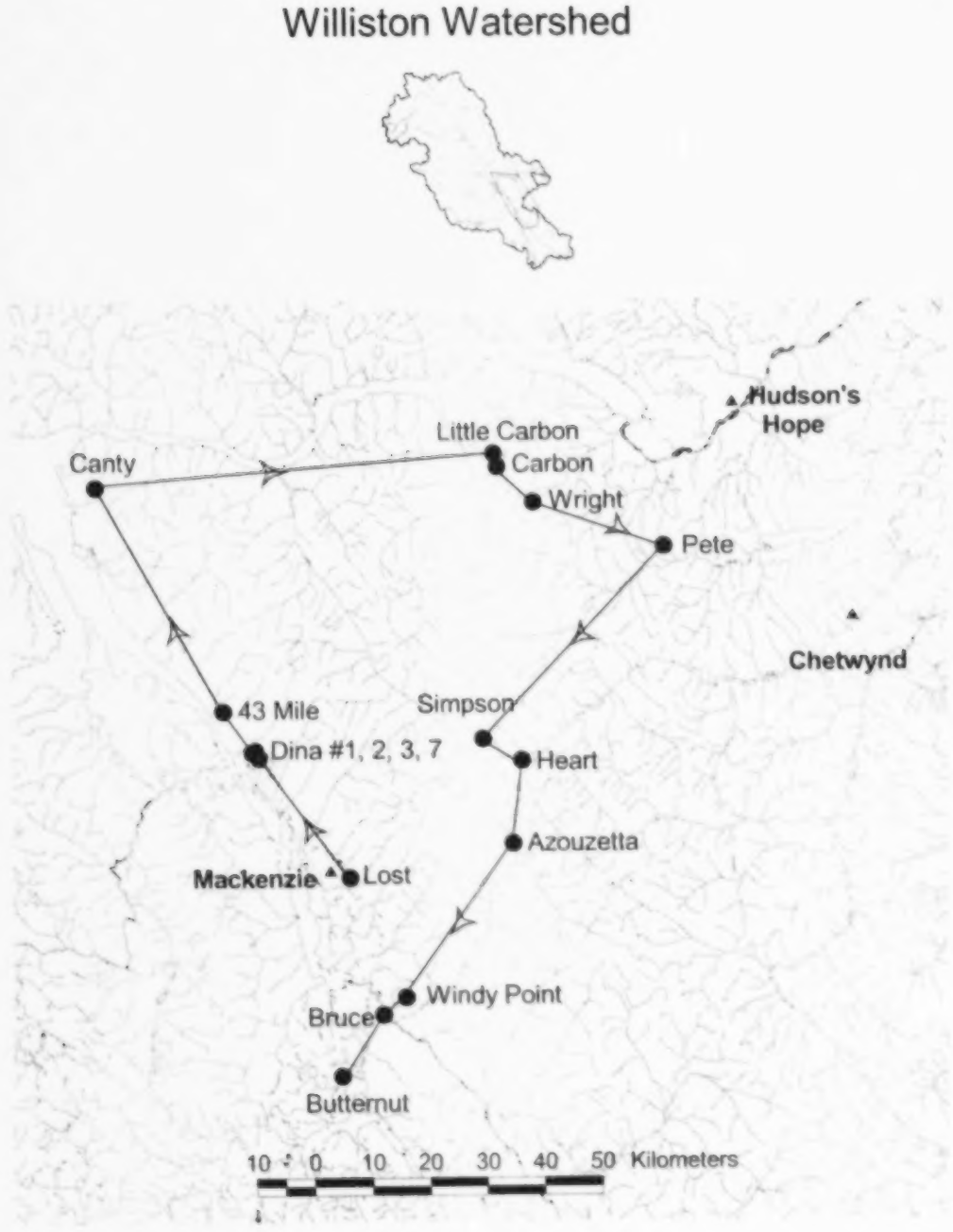


Figure 1. Flight line for aerial boat counts near Mackenzie B.C.

Table 1. Date at which the lakes were 100 % ice free.

Lake	May 11	May 18	May 19	May 25	June 1	June 2	June 8	June 15
Dina #7	on	**off**						
Windy Point	on (15)	**off**						
Dina #3	on	on	**off**					
Dina #2	on	on	**off**					
Lost	on	on	on	**off**				
Dina #1	on	on	on	**off**				
43 Mile	on	on	on	**off**				
Pete	on	on	on	**off**				
Bruce	on (30)	on	on	**off**				
Butternut	on (6)	on	on	**off**				
Carbon	on	on	on	on	**off**			
Wright	on	on	on	on	**off**			
Heart	on	on (12)	on	on	**off**			
Azouzetta	on	on	on	on	on	on	**off**	
Canty	on	on	on	on	on	on	on	**off**
Little Carbon	on	on	on	on	on	on	on	**off**
Simpson	on	on	on	on	on	on	on	**off**

Note : numbers in brackets refer to the number of possible ice fishing holes observed during each flight.

Only two of the 17 lakes were ice free on the May 18 flight. Ice fishing was apparent on some of these lakes during the earlier flights. Heart, Bruce, Windy Point, and Butternut Lakes were the only lakes that showed any evidence of use (ice fishing holes) by anglers. The lakes located around the Mackenzie area become ice free before the lakes in the Pine Pass and Hudson's Hope area. All lakes were ice-free by mid-June. The spring of 2002 was unusually late and ice-off times may vary from year to year. Snowmobile tracks were present on a few lakes but no evidence of ice fishing use could be determined from them.

Many different characteristics may determine whether a lake will be highly used by anglers (Table 2). Some of the possible indicators observed in this survey are vehicle access, number of campsites present, size of the lake, and what species is stocked in a particular lake. Approximately half of the lakes (7 of 17) have vehicle access with an area to launch a car top boat. Ten of the lakes also have campsites available. Most of them would only hold a truck and camper or a small travel trailer. We suspect that most car top boats would be observed on access lakes while the majority of the belly boats would be at the hike in lakes. The size of surveyed lakes ranged from 3.7 to 186.0 ha. Only two species of fish are currently being stocked in the survey lakes: eastern brook trout and rainbow trout.

Table 2. Lake characteristics.

Lake	Vehicle Access Present	Campsite Present	Size (ha)	Fish Stocked	Fish Stock Release	Average Release per ha
43 mile	No, 250 m hike	No	19.7	RB	1,500	76.1
Azouzetta	Yes	Yes (6)	186.0	RB	5,000	26.9
Bruce	No, 2 km ATV	Yes (1)	38.8	EB	5,000	128.9
Butternut	Yes	Yes (3)	35.5	RB	3,000	84.5
Canty	No, 5 km hike	Yes (1)	7.5	RB	2,500	333.3
Carbon	Yes	Yes (3)	70.4	natural RB	0	n/a
Dina #1	Yes	Yes (5)	158.3	RB	20,000	126.3
Dina #2	Yes	No	29.5	EB	10,000	339.0
Dina #3	No, 1 km hike	Yes (1)	20.8	RB	2,500	120.2
Dina #7	No, 1.5 km hike	No	7.5	RB	1,500	200.0
Heart	Yes	Yes (5)	12.5	EB & RB	1,000/1,500	80/120
Little Carbon	No, 4 km hike	Yes (1)	3.7	RB	500	135.1
Lost	No, 1 km hike	No	9.6	EB	2,500	260.4
Pete	No, 200 m hike	No	est. 40.0	RB	2,500	62.5
Simpson	No, 1 km hike	No	31.2	RB	Note[A]	n/a
Windy Point	Yes	No	9.5	RB	2,500	263.2
Wright	No, 2 km ATV	Yes (2)	23.2	RB	2,000	86.2

[A]Note - total number of fish stocked over four years = 294

During the 19 flights (Appendix 2), 262 boats and shore anglers were counted (Table 3). Lakes with vehicle access received the highest angler use. Azouzetta, Dina #1, Heart, and Carbon Lakes had the most total angler use throughout the summer months (Figure 2) while Canty, Dina # 7, Little Carbon, and Lost Lakes had no angler sightings. All 4 high use lakes have vehicle access directly to the lake while all 4 lakes with no angler sightings are hike in lakes.

Shore boats were the most commonly counted during the survey. This number may not be precise as some boats remained on lakeshores all summer and may have been counted repetitively. There are 3 lakes in question: Azouzetta, Carbon, and Windy Point. A boat on Windy Point for example belongs to the lodge owner and it remained on shore for many months. The pilot still counted this particular boat during each flight as a shore boat and thus may have over estimated the count for the lake. Determining the exact extent of shore boat overestimation is impossible but it could be in excess of 10 % for these three lakes.

Table 3. Total number of boats and shore anglers sighted at each lake.

Lake	Total Lake Boats	Total Belly Boats	Total Shore Boats	Total Shore Anglers	Total Usage
Azouzetta	20	0	36[A]	1	57
Dina #1	9	1	27	0	37
Heart	8	4	19	2	33
Carbon	10	0	19[A]	1	30
Simpson	7	6	6	5	24
Windy Point	3	1	19[A]	1	24
Butternut	8	5	2	0	15
Pete	5	3	2	2	12
Bruce	1	0	8	0	9
Wright	2	0	2	4	8
Dina #3	1	3	0	1	5
43 Mile	2	2	1	0	5
Dina #2	2	1	0	0	3
Canty	0	0	0	0	0
Lost	0	0	0	0	0
Dina #7	0	0	0	0	0
Little Carbon	0	0	0	0	0
Total	78	26	141	17	262

[A] Note: Shore boat counts could be artificially high on Azouzetta, Carbon, and Windy Point Lakes.

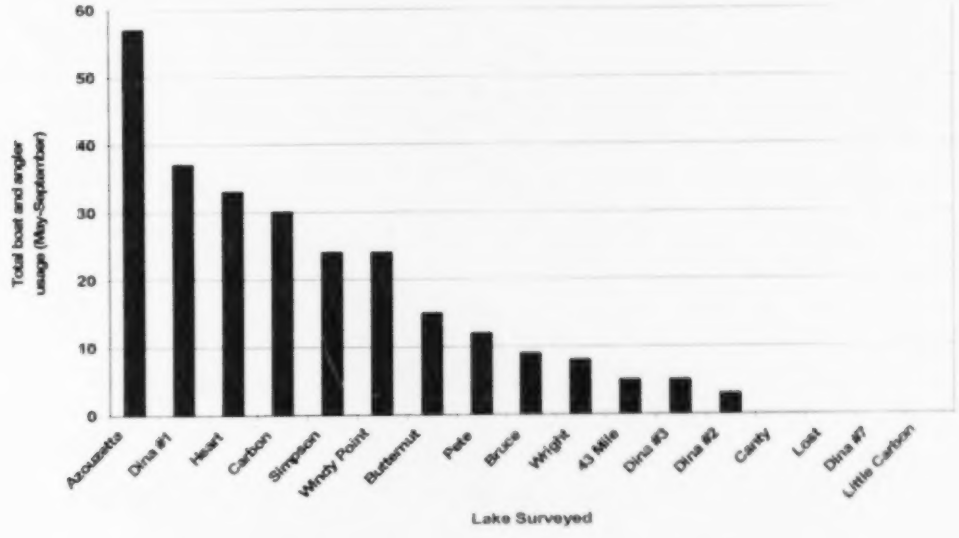


Figure 2. Total number of counts for all flights, May through September.

Shore anglers were observed the least amount during the 2002 survey (Figure 3). At times, it would be difficult for the pilot to accurately assess the entire shoreline of these lakes. Anglers can blend in with the environment making them more difficult to detect than boats on the water. It is also that possible some anglers could have been missed while the plane was banking. As a result, we feel that the shore angler data could be underestimated and will only be used as a minimum count.

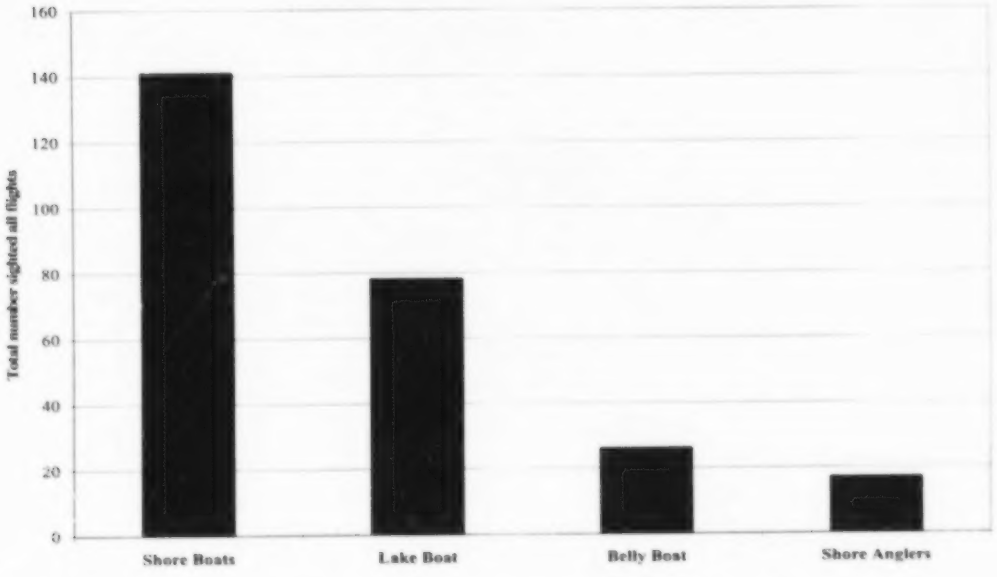


Figure 3. Total number and type of boats observed during all 19 flights.

When determining the actual amount of estimated angler use for these lakes, we were more confident in the lake boat and belly boat data. As mentioned, the shore boat data could be overestimated and the shore anglers could be underestimated. In addition, we presume that access to these lakes is one key factor when anglers are selecting lakes to fish. Azouzetta had the highest average lake boat sightings (Figure 4). It also was the only lake that averaged more than one lake boat per sighting but the frequency of angler presence is quite variable. Most of the remaining lakes (11/16) received less than 0.5 lake boats per sighting.

Of the 6 highest lake boat use lakes, only one of them did not have vehicle access. Simpson Lake does not have vehicle access but there were lake boat sightings there. Anglers were therefore willing to haul in a lake boat to fish this lake on a more frequent basis.

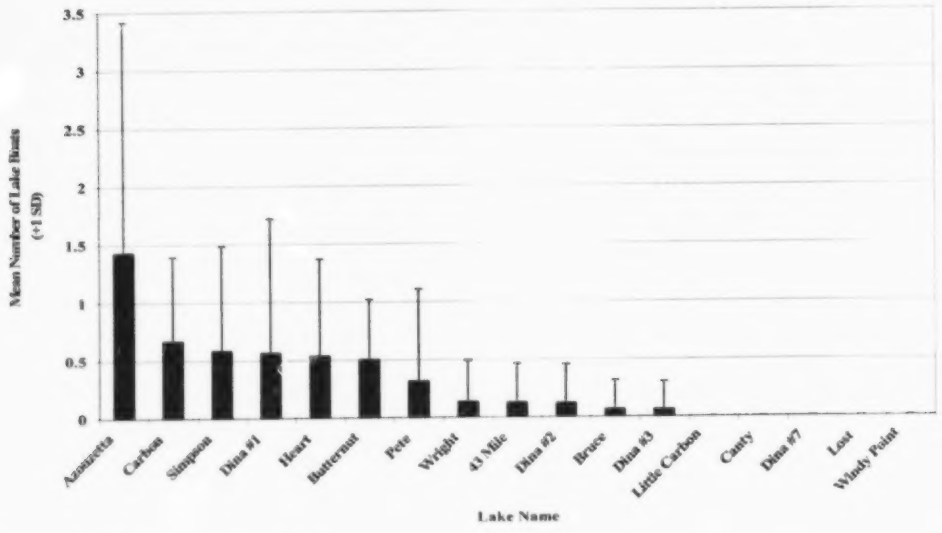


Figure 4. Mean boats per lake.

Belly boat sightings were less than lake boat sightings (Figures 4 & 5). The mean count of belly boat sightings is quite low; even the most popular lakes averaged less than 0.5 sightings / flight. Simpson Lake had the highest average use for belly boats.

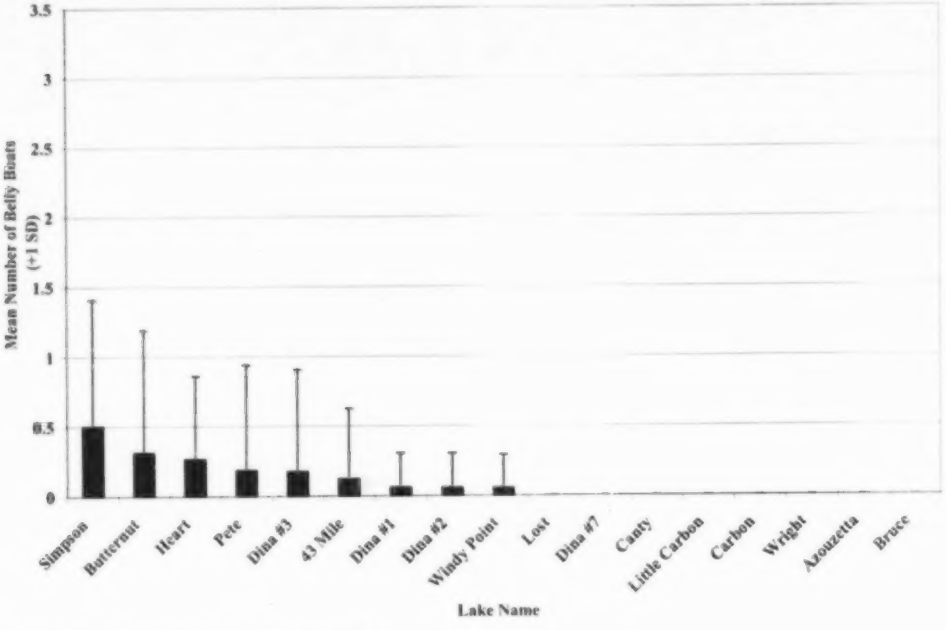


Figure 5. Mean belly boats per lake.

Again, the average use numbers indicate a high standard deviation for some lakes. Of the highest use belly boat lakes, 4 of the top 6 lakes did not have vehicle access.

The size of a particular lake may also be a factor in fishing effort. When comparing use / ha, Heart Lake was the most popular lake for both types of boats (Figures 6 & 7).

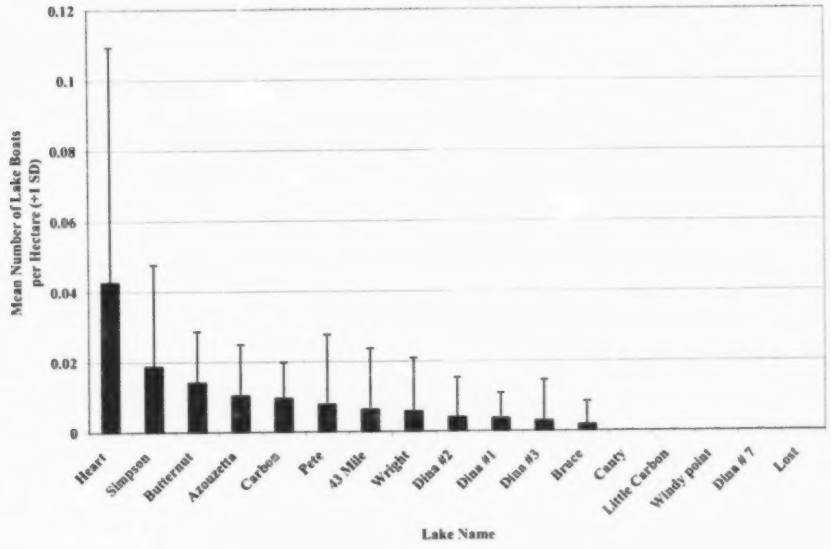


Figure 6. Mean lake boats per hectare.

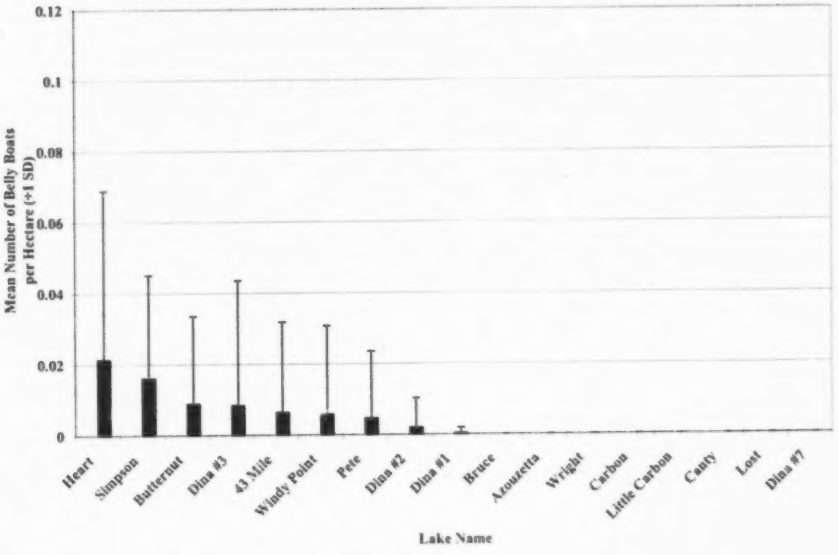


Figure 7. Mean belly boats per hectare.

In addition to Heart, Simpson and Butternut Lakes also received higher use based on a per hectare basis. These lakes are relatively small (<35 ha) and receive a fair amount of use. Although, high variance in observations was also noted for both boat types per size of lake.

Time of year does not appear to be a factor affecting average angler use. While more flights were conducted in some months, the average use per trip was similar (Table 4, Figure 8). Total use can not be accurately determined for May because all lakes still had ice on them. June through August all received about the same amount of use (~18 sightings / trip). Effort in September dropped slightly to approximately 14 sightings / trip.

Table 4. Average air temperature and total sightings in each month of aerial surveys.

Month	Number of Flights Conducted	Average Air Temperature	*Total Usage	Average Use/Trip
May	4	7.6	4	1.0
June	7	11.9	123	17.6
July	2	11.9	35	17.5
August	4	12.3	72	18.0
September	2	12.5	28	14.0

*Total usage includes all boats and shore anglers sighted on all flights.

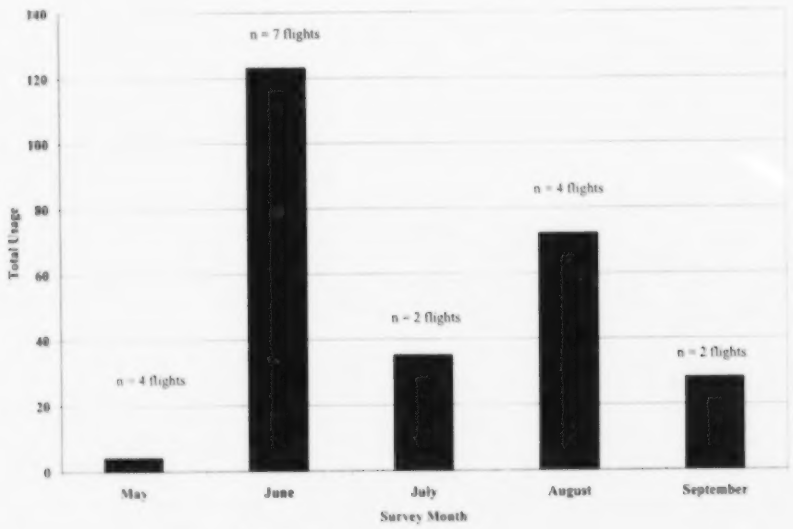


Figure 8. Total angler use by survey month.

Weather conditions do not appear to be a major factor in angler use. Anglers were observed throughout the summer in a wide range of weather conditions (sunny, overcast, drizzle, heavy rain, etc.). The average air temperatures between the four summer months were also quite similar (Table 4).

Campsites, rather than poor weather conditions, appears to be more important to anglers. Campers were observed consistently throughout the summer (flights #5 to #19). Lakes with areas to park a camper or trailer had some of the highest use throughout the survey period. Heart, Dina #1, Azouzetta, and Carbon Lakes had the most number of campers observed throughout the summer (Figure 9). Truck campers were the most frequently observed recreational vehicle. Heart and Azouzetta Lakes are located along a major highway while Dina #1 and Carbon Lakes require travel on a gravel Forest Service road.

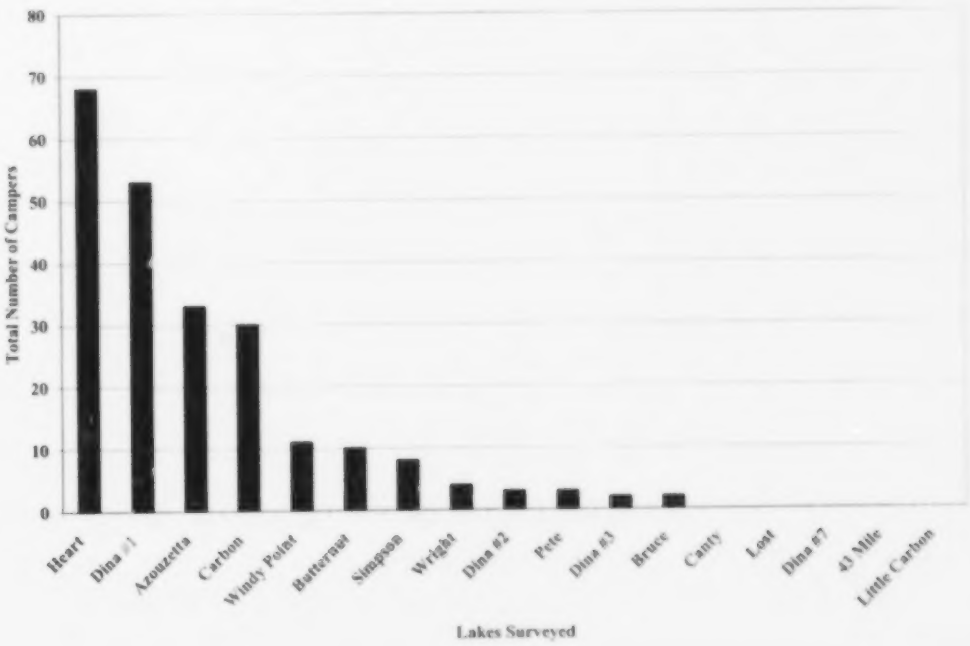


Figure 9. Total number of campers observed during the 2002 aerial boat count.

DISCUSSION

Angler use can be dependant on a number of different lake characteristics. Vehicle access right to the lakeshore may be important to some users. Some anglers may prefer lakes with

a boat launch. Alternatively, some anglers may prefer to fish on a secluded lake using a belly boat. Campsites at lakes can also be desired. Smaller lakes (which have less wind exposure) may be more desirable than larger lakes which may have high winds that make boating difficult during bad weather. In addition, the species of fish preferred may also dictate angler use.

Ford (1989) found that other lake characteristics can influence angling effort; variables like stocking rate, surface area, and distance traveled to the lake are important. Aerial boat counts can not be used to obtain answers on angler preferences. No obvious trends could be identified with the data collected on the effort versus the distance traveled to the lake. However, we observed some trends with the type of boat used compared to ease of access.

When looking at angler use versus vehicle access, the lakes with vehicle access received much more use than the hike in lakes (Appendix 3). The lakes with the highest total use (> 20 sightings) are all very accessible by vehicle. Five of the top 6 lakes used by lake boats had a boat launch. This larger type of boat is more suited to lakes that have vehicle access. Belly boat users focused on hike in lakes (4 of the top 6 used). Belly boat anglers appear to target lakes without vehicle access (pristine type lakes), while lake boat users utilized the vehicle access sites.

Four of the remaining lakes received no apparent use throughout the summer: Canty, Dina #7, Little Carbon, and Lost. These lakes are all hike in only. Observing no angler activity on these lakes does not mean they are not used at all for angling. They are however, probably used to a lesser degree than the other lakes in this survey. Program staff have observed anglers on each of these lower use lakes in the past.

Comparing the average fish release per ha versus effort, one would expect anglers to prefer lakes which receive high stocking numbers. However, the aerial boat count data suggests this is not the case (Appendix 3). The majority of the high use lakes (> 20 observations) contain less than 100 fish stocked per ha. Lakes which receive more than 250 fish per ha received less than 20 sightings throughout the summer of 2002. As a result of lower stocking densities, these lakes may have larger fish and therefore become more favorable fisheries. Angler preferences would have to be verified with a follow-up creel survey.

Due to a different number of flights carried out each month, it is difficult to determine which months receive more angler use. June had the most activity recorded; however, there were more than double the number of flights in June compared to other months. The

average use per trip in June, July, and August were all very similar. Windy Point was the only location to have activity in all 5 months surveyed.

Angler activity was slowest in May when the temperature was low and many of the lakes still had ice on them. Higher elevation lakes thus receive less use earlier in the fishing season. Other than early in the season, temperature does not seem to effect the amount of activity. Average temperatures were within 1° C of each other between June and September. After ice off in May, the data collected in this study does not suggest a correlation between temperature and angler activity.

A number of campsites were used throughout the summer months but only a future creel survey will determine how necessary they are to anglers. The pilot was unable to record which types of rods were being used (i.e. spin cast versus fly rod). Again, a creel survey would help determine the types of experiences anglers prefer.

When conducting these aerial boat counts, it is assumed that more people will be fishing on the weekends than weekdays and that the anglers recognize which lakes provide a better fishing experience. We suspect there is some bias towards capturing only "instantaneous boat counts" at a single time strata (midday on weekends). It is possible there is a lot angling during weekdays that is missed with this type survey. For example, retired folks or people who work shifts in the local mills around Mackenzie may commonly use these lakes on weekdays. Our recommendation for future surveys would be to examine the demographics of British Columbia and ensure that these types of surveys randomly include all weekdays and weekends.

There are many other factors that may increase or decrease activity. Some lakes may be targeted based on their size, proximity from home, size of fish, number of fish, or species of fish. Many of these factors can not be addressed in an aerial survey. Future creel surveys would aid in determining the answers to some of these types of questions. The important finding of this aerial boat survey is that certain lakes are being used more heavily than others within the Williston watershed. Lakes like Heart, Simpson, and Butternut are receiving the most pressure and future stocking assessments on these lakes will ensure that they are not getting over harvested. Since the confidence around our estimates of use is variable, it is recommended that this same project be undertaken in another 5 year time frame to compare the differences.

LITERATURE CITED

Ford, B.S. 1989. Factors influencing the spatial distribution of sport fishing effort in the Okanagan region of British Columbia. Report No. 77. Natural Resource Management Program, Simon Fraser University, Burnaby, B.C. 91pp.

Tredger, C.D. 1990. Small Lakes Index Management: Analysis of 1989 Results. Fisheries Project report No. FAIU – 17., Recreational Fisheries Branch, Victoria, B.C.

Tredger, C.D. 1991. Estimation of angler effort using index boat counts. Fisheries Technical Circular No. 94.

Parkinson, E.A., J. Berkowitz, and C.J. Bull. 1988. Sample size requirements for detecting changes in some fisheries statistics from small trout lakes. N. Am. J. of Fish. Mgmt. 8:181-190.

Appendix 1

Aerial Flight Schedule

Peace/Williston Aerial Flight Dates

Flight Number	Date
1	11-May Sat
2	18-May Sat
3	19-May Sun
4	25-May Sat
5	1-Jun Sat
6	2-Jun Sun
7	8-Jun Sat
8	15-Jun Sat
9	16-Jun Sun
10	22-Jun Sat
11	29-Jun Sat
12	7-Jul Sun
13	20-Jul Sat
14	4-Aug Sun
15	10-Aug Sat
16	17-Aug Sat
17	25-Aug Sun
18	1-Sep Sun
19	14-Sep Sat

Note: first scheduled flight was originally May 5 but was cancelled due to complete ice cover on all lakes.

Appendix 2

Raw Data Sheets

Instructions for completing **AERIAL BOAT COUNT** data forms

The Contractor is to fill out the data form specific for a given flight line, and forward to the Contract Monitor (Randy Zemlak), Fax # (250) 565 – 6629.

FIELD	DATA REQUIRED
Date:	(yyyy/mm/dd) format
Number:	lake number in order of occurrence on the flight line (these numbers should be noted for reference on flight line maps)
Lake Name:	in order of occurrence on the flight line
Time at Lake:	time of lake count in 24-hour clock format arrival time at lake when observations begins
Lake Boats:	number of boats actively fishing
Belly Boats:	number of belly boats actively fishing
Shore Boats:	number of boats observed on shore
Shore Anglers:	number of people observed angling from shore
Weather Rating:	this is an overall rating G = Good (i.e. sunny, cloudy periods, no rain) F = Fair (i.e. light rain or wind; overcast) P = Poor (i.e. rain, snow, wind, seasonally cold)
W. Conditions:	briefly describe what the actual weather condition at that particular lake is like (sunny, cloudy, light rain, heavy rain, overcast, snow, windy)
Campers Present:	record the number of campers present (i.e. 1 T = 1 tent, 2C = 2 campers, 2TT = 2 travel trailers)
Comments:	relevant comments can be included in this column

P/W AERIAL BOAT COUNTS - 2002 **FLIGHT #1**

Date : May 11

Day of Week: Sat | Sun

Day Type: Weekend | Long Weekend

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	1003					G	5	Sunny		ice cover
Dina #7	1015					G	5	Sunny		
Dina #3	1017					G	5	Sunny		
Dina #2	1018					G	5	Sunny		
Dina #1	1020					G	5	Sunny		ice cover
43 Mile	1025					G	5	Sunny		ice cover
Canty	1040					G	5	Sunny		ice cover -2
Little Carbon	1100					G	5	Sunny		ice cover 0
Carbon	1104					G	5	Sunny		ice cover, no one at lodge
Wright	1110					G	5	Sunny		ice cover, Gething Cr. open
Pete	1130					G	5	Sunny		hard to see access to lake, 4
Simpson	1145					G	5	Sunny		snow mobile track on lake, 1
Heart	1153					G	5	Sunny		snow mobile track on lake
Azouzetta	1200					G	5	Sunny		thick ice
Bruce	1210					G	5	Sunny		approx. 30 ice fishing holes
Windy Point	1215					G	5	Sunny		approx. 15 ice fishing holes
Butternut	1220					G	5	Sunny		approx. 6 ice fishing holes

P/W AERIAL BOAT COUNTS - 2002 **FLIGHT #2**

Date : May 18

Day of Week: Sat Sun

Day Type: Weekend Long Weekend

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	1001					G	5	sunny, clear		80% broken ice on lake
Dina #7	1008					G	6	sunny, clear		clear of ice
Dina #3	1010					G	6	sunny, clear		10%ice on lake
Dina #2	1012					G	6	sunny, clear		10% ice
Dina #1	1014					G	6	sunny, clear	1	90% ice, west arm open
43 Mile	1021					G	6	sunny, clear		90% ice
Canty	1036					G	-1	sunny, clear		100% snow, ice
Little Carbon	1058					G	3	sunny, clear		100% snow, ice
Carbon	1102					G	7	sunny, clear		100% green ice
Wright	1107					G	7	sunny, clear		100% grey ice,
Pete	1116					G	10	sunny, clear		90% ice, thin ice
Simpson	1133					G	5	sunny, clear		50% white, 50% green ice
Heart	1139					G	10	sunny, clear		100% ice, 12 holes
Azouzetta	1149					G	11	sunny, clear		100% ice,
Bruce	1203					G	12	sunny, clear		70% ice
Windy Point	1207			1		G	10	sunny, clear		100% open
Butternut	1212					G	10	sunny, clear		90% ice, snow on trail

P/W AERIAL BOAT COUNTS - 2002 **Flight #3**

Day of Week: May 19
Sat | Sun

Day Type: Weekend | Long Weekend

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	958					G	9	sunny, clear		5% ice cover,
Dina #7	1006					G	9	sunny, clear		100% clear of ice
Dina #3	1007					G	9	sunny, clouds		100% clear of ice
Dina #2	1010	1				G	9	sunny, clouds	1	
Dina #1	1013					G	9	sunny, clouds	2	ice on S shore
43 Mile	1023					G	9	sunny, clouds		very thin ice
Canty	1039					G	5	sunny, clouds		centre of lake white
Little Carbon	1101					P	0	low overcast		lake ice is green
Carbon	1106					F	2	overcast		all thin ice
Wright	1113					F	4	overcast		canoe in campsite
Pete	1122					F	6	high overcast		60% broken thin ice
Simpson	1136					F	4	overcast		50% green ice, 50% white
Heart	1143					F	8	overcast	2	thin ice
Azouzetta	1155					G	7	cloudy		50% green, 50% white
Bruce	1206					G	12	few clouds		water open
Windy Point	1210	1				G	12	few clouds	1	water all open
Butternut	1217					G	12	few clouds		70% ice

P/W AERIAL BOAT COUNTS - 2002 **FLIGHT #4**

Date: May 25

Day of Week: Sat Sun

2002 05 25

Day Type: Weekend Long Weekend

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	1005					G	10	sunny		100% ice free
Dina #7	1013					G	10	sunny		100% ice free
Dina #3	1015					G	10	sunny		100% ice free
Dina #2	1016					G	10	sunny		100% ice free, took pictures
Dina #1	1027					G	10	sunny		100% ice free, seems murky
43 Mile	1030					G	10	sunny		100% ice free
Canty	1044					G	7	sunny		100% ice cover, 1 ice fishing hole
Little Carbon	1105					G	9	sunny		100% ice cover
Carbon	1108					G	11	sunny		95% ice cover
Wright	1114					G	11	sunny		95% ice cover, dam present
Pete	1125					G	14	sunny		100% ice free, tannic color
Simpson	1142					G	9	sunny		100% ice cover
Heart	1148					G	9	sunny		80% ice free
Azouzetta	1158					G	14	sunny		95% ice cover, green ice
Bruce	1210					G	15	sunny		100% ice free, dam outlet
Windy Point	1218		1	1		G	15	sunny		1 pontoon boat and fly fishing
Butternut	1224					G	14	sunny		100% ice free

P/W AERIAL BOAT COUNTS - 2002 **FLIGHT #5**

Date : June 1

Day of Week: Sat Sun

Day Type: Weekend Long Weekend

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	1001					G	9	sunny, clouds		no activity
Dina #7	1011					G	9	sunny, clouds		no activity
Dina #3	1013					G	9	sunny, clouds		no activity
Dina #2	1015					G	9	sunny, clouds		no activity
Dina #1	1018			2		G	8	sunny, clouds	4	1 camper truck 1 tent 2 trailers
43 Mile	1024					G	9	sunny, clouds		very clear water in lake
Canty	1040					G	4	sunny, clouds		lots of snow on lake
Little Carbon	1058					G	4	sunny, clouds		lots of snow
Carbon	1102	1				G	8	sunny, clouds	2	boat going across lake
Wright	1109					G	8	sunny, clouds		canoe on shore
Pete	1118					G	11	40% clouds		lots birds , fish jumping
Simpson	1133					G	7	40% clouds		road snow lake ice
Heart	1137		2			G	12	40% clouds	3	2 people at camp fire
Azouzetta	1147					G	11	50% clouds		lake has 20% ice on S shore
Bruce	1200	1				G	10	50% clouds		2 people in boat
Windy Point	1205					F	10	80% clouds	1	motor home camping with boat
Butternut	1213	1				F	10	80% clouds	1	2 people trolling moose in lake

P/W AERIAL BOAT COUNTS – 2002 **FLIGHT #6**

Date : June 2

Day of Week: Sat | Sun

Day Type: Weekend | Long Weekend

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	1000					G	9	few clouds		light north breeze
Dina #7	1009					G	10	sunny clear		nice calm day, no activity
Dina #3	1010	1			1	G	10	sunny clear	2	on east point
Dina #2	1013					G	10	sunny clear		
Dina #1	1016			6		G	10	sunny clear	4	
43 Mile	1025					G	10	sunny clear		
Canty	1040					G	7	sunny clear		9 holes just starting to open
Little Carbon	1100					G	7	50% cloud		all ice yet
Carbon	1102	1		1		G	12	60% cloud	1	van and boat trailer
Wright	1110					G	10	40% cloud		water flowing around dam
Pete	1119	1	3			G	13	40% cloud		truck parked S of lake
Simpson	1140					G	10	40% cloud		water flowing past end of lake
Heart	1142					G	14	20% cloud	2	quite windy, 4 vehicles total
Azouzetta	1151	1		1		G	12	30% cloud		20% ice left on lake
Bruce	1203					G	13	70% cloud	1	2 people at lake
Windy Point	1209					G	14	80% cloud		1 paddle boat half in water
Butternut	1214	1				G	14	80% cloud	1	2 in canoe and 2 more trucks

P/W AERIAL BOAT COUNTS - 2002 **FLIGHT #7**

Date: June 8

Day of Week: Sat Sun

Day Type: Weekend Long Weekend

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	958					P	4	drizzle, low cloud		
Dina #7	1006					P	5	drizzle, low cloud		
Dina #3	1008					P	5	drizzle, low cloud		
Dina #2	1010					P	5	drizzle, low cloud		
Dina #1	1012			1		P	5	drizzle, low cloud	4	1 canoe 1 boat in camp
43 Mile	1018					P	5	drizzle, low cloud		
Canty	1034					F	6	fresh snow		lake 100% ice
Little Carbon	1055					P	4	drizzle, low cloud		lake getting ready to open
Carbon	1058			3		P	9	fog and drizzle	2	2 more trucks
Wright	1105					P	8	fog and drizzle		much water passing dam
Pete	1115					G	9	sun high broken		lots of water on access road
Simpson	1134					G	8	sun high broken		snow on road 20 holes on lake
Heart	1138					G	10	sun high broken	1	road is wet
Azouzetta	1145			2		F	9	high overcast		boats in yard near lake
Bruce	1156					G	9	sun high broken		
Windy Point	1201	1				G	8	sun high broken	3	3 people unloading boat
Butternut	1207	1		1		G	9	sun high broken	2	4 people 2 boats

P/W AERIAL BOAT COUNTS - 2002 **FLIGHT #8**

Date : June 15

Day of Week: Sat Sun

Day Type: Weekend Long Weekend

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	958					G	16	clear smoky		road very wet
Dina #7	1007					G	17	clear smoky		
Dina #3	1009					G	17	clear smoky		very clean water
Dina #2	1011					G	17	clear smoky		canoe and 2 people
Dina #1	1014			2		G	17	smoky day	6	
43 Mile	1021					G	18	clear smoky		boat underwater east end
Canty	1035					G	16	lsnow in trees		lots of water flowing out
Little Carbon	1055					G	19	clear nice day		lake all open water
Carbon	1059	2		3		G	21	very nice	6	2 boats in campsite
Wright	1107				4	G	21	very nice	1	1 truck east 1 mile away
Pete	1117					G	19	20% high cloud		quite windy
Simpson	1136					G	17	20% high cloud		3 people backpacks
Heart	1141					G	22	clea nice	2	1 tent day people
Azouzetta	1148	2		5		G	19	clear	6	zodiac and metal
Bruce	1202					G	20	50% high cloud		no trucks or people
Windy Point	1206	1		2	1	G	20	70% high cloud	1	2 casting E side
Butternut	1213	1				G	20	80% high cloud	1	canoe fishing

P/W AERIAL BOAT COUNTS - 2002 **FLIGHT #9**

Date : June 16

Day of Week: Sat | Sun

Day Type: Weekend | Long Weekend

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	1002					G	16	clear		
Dina #7	1010					G	17	clear		
Dina #3	1012		3			G	17	clear		belly boats all clumped
Dina #2	1015					G	17	clear		
Dina #1	1017			4		G	17	clear windy	5	
43 Mile	1025					G	16	clear windy		
Canty	1038					G	11	clear windy		no activity
Little Carbon	1100					P	8	could not get there		
Carbon	1103	1		1		P	8	low overcast rain	2	2 quads at log bridge
Wright	1110	1				P	8	low overcast rain	1	
Pete	1123					F	8	low overcast		dog 2 quads 1 canoe
Simpson	1140					F	9	low overcast wind		
Heart	1145					F	12	some sun	1	1 boat at island 2 on beach
Azouzetta	1152	2				G	13	50% high broken		boat may be there for season
Bruce	1207					G	17	50% high broken		
Windy Point	1211			2		G	19	50% high broken		
Butternut	1215	1	2	1		G	19	50% high broken		

P/W AERIAL BOAT COUNTS - 2002 **FLIGHT #10**

Date : June 22

Day of Week: Sat Sun

Day Type: Weekend Long Weekend

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	1000					G	15	clear		
Dina #7	1008					G	16	clear		
Dina #3	1011					G	16	clear		
Dina #2	1012		1			G	16	clear		truck parked at road edge
Dina #1	1014		1	4		G	16	clear	3	metal boat loading for fishing
43 Mile	1022	1				G	16	clear		2 people fishing
Canty	1034					G	13	clear windy		water flows past dam
Little Carbon	1053					G	15	clear windy		
Carbon	1056	1		1	1	G	16	clear windy	1	metal boat crossing lake
Wright	1103					G	16	clear windy		
Pete	1111					G	19	clear windy		no vehicles
Simpson	1127					G	17	clear windy		snow all off road
Heart	1137	2				G	20	clear	5	2 people in metal boa casting
Azouzetta	1145	4			5	G	18	clear		all 4 boats fishing, no campers
Bruce	1158			1		G	18	clear		still same boat near dock
Windy Point	1200			2		G	18	clear	1	day camping with many kids
Butternut	1208		3			G	18	clear	2	2 fly fishing

P/W AERIAL BOAT COUNTS - 2002 **FLIGHT #11**

Date: June 29

Day of Week: Sat Sun

Day Type: Weekend Long Weekend

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	1002					F	9	ove 3500'		
Dina #7	1012					F	8	light rain		
Dina #3	1013					F	8	light rain		
Dina #2	1021					F	7	light rain		
Dina #1	1015			1		F	7	light rain	3	
43 Mile	1033					F	8	light rain		
Canty	1048					F	11	light rain		boat upside down onshore
Little Carbon	1114					G	1	mist		
Carbon	1115			5		G	8	mist	6	
Wright	1125			1		G	8	clear		
Pete	1133	1				G	3	windy		1 truck
Simpson	1154					G	4	windy		
Heart	1207			1		G	6	windy	14	
Azouzetta	1218	7		2		G	10	windy	13	
Bruce	1232			2		G	10	clear		
Windy Point	1237			1		G	10	clear	1	
Butternut	1240					G	12	clear		

P/W AERIAL BOAT COUNTS - 2002 **FLIGHT #12**

Date : July 7

Day of Week: Sat | Sun

Day Type: Weekend | Long Weekend

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	1000					G	10	north breeze		road very wet, fresh tracks
Dina #7	1009					G	10	north breeze		
Dina #3	1010					G	10	north breeze		lots of birds on water
Dina #2	1012	1				G	10	north breeze		1 truck 2 people trolling
Dina #1	1015			1		G	10	north breeze	3	1 canoe on a camper truck
43 Mile	1022					G	11	clear, breeze		
Canty	1037					G	8	west breeze		
Little Carbon	1058					G	9	clear		
Carbon	1101	1		1		G	12	clear	1	canoe on shore and 1 fishing
Wright	1106	1				G	12	clear	2	1 truck and 2 trailers
Pete	1116	3		2	2	G	15	clear	3	2 trucks 3 camper trucks
Simpson	1132				2	G	12	clear		3 quads, 4 going up road
Heart	1143	1	1	2		G	16	clear	3	
Azouzetta	1151			2		G	16	clear		water out of south side
Bruce	1201			1		G	14	clear, breeze		
Windy Point	1205			2		G	15	clear, breeze	1	
Butternut	1210					G	16	clear, breeze		

P/W AERIAL BOAT COUNTS - 2002 **FLIGHT #13**

Date: July 20

Day of Week: Sat

Day Type: Weekend

* VERY SLOW DAY FISHING

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	1002					F	12	overcast		very wet road
Dina #7	1011					F	12	overcast, breeze		
Dina #3	1012					F	12	overcast, breeze		
Dina #2	1013					F	12	overcast, breeze		
Dina #1	1015	1		1		F	12	overcast, breeze	2	
43 Mile	1023	1				F	12	broken at 4,000'		2 in canoe fishing
Canty	1038					F	9	low cloud rain		
Little Carbon	1100					P	8	overcast and rain		
Carbon	1102	1				P	11	overcast, drizzle	3	2 persons in boat
Wright	1107					P	11	overcast, drizzle		
Pete	1115					F	11	6000' , drizzle		
Simpson	1130	1				F	9	8000' overcast	1	catching many fish
Heart	1135	2		2		G	14	high broken	8	very busy
Azouzetta	1143			1		G	12	high broken	1	
Bruce	1202					G	14	high broken		
Windy Point	1205			1		G	14	nice day - broken	1	
Butternut	1209	1				G	14	nice day - broken	1	

P/W AERIAL BOAT COUNTS - 2002 **FLIGHT #14**

Date : August 4

Day of Week: Sat | Sun

Day Type: Weekend | Long Weekend

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	1003					F	10	broken clouds		windy
Dina #7	1012					F	8	broken clouds		windy
Dina #3	1014					F	10	broken clouds		boat at portage
Dina #2	1016					F	10	broken clouds		
Dina #1	1018					F	10	broken clouds	2	4 pick ups, boats on top
43 Mile	1024			1		F	10	broken clouds		1 person on shore
Canty	1037					F	6	broken clouds		1 boat on shore
Little Carbon	?	?	?	?	?	?	?	?	?	low cloud, no flight
Carbon	1106			2		P	4	cloud, light rain	3	3 vehicles plus camper
Wright	1113					P	4	low cloud		low cloud, no rain
Pete	1129					P	5	low cloud		
Simpson	1145	1	2	1	3	F	5	cloud/wind	1	6 vehicles, 2 with boats
Heart	1150	2		6		F	5	cloud/wind	11	shore boats unoccupied
Azouzetta	1200	1		2		F	7	cloud/wind	5	shore boats with motors
Bruce	1210					F	10	windy		
Windy Point	1214					F	12	windy		
Butternut	1218					F	12	windy		

P/W AERIAL BOAT COUNTS - 2002 **FLIGHT #15**

Date: August 10

Day of Week: Sat | | Sun

Day Type: Weekend | Long Weekend

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	1001					G	10	clear		light breeze
Dina #7	1009					G	11	few clouds		light breeze
Dina #3	1010					G	11	few clouds		light breeze
Dina #2	1012					G	11	few clouds		light breeze
Dina #1	1013					G	11	few clouds		no vehicle around
43 Mile	1019					G	11	few clouds		light breeze
Canty	1032					G	8	overcast	1	2 trucks near mountain
Little Carbon	1059					G	9	overcast, windy		
Carbon	1103					G	12	overcast, windy		
Wright	1108					G	12	overcast, windy		
Pete	1115					G	14	scattered, windy		2 white swans
Simpson	1130	1	2	1		G	9	overcast, windy		truck trailer and quad
Heart	1138			2		G	13	broken, windy	4	very windy
Azouzetta	1143			2		G	12	overcast. Windy		
Bruce	1154			1		G	12	few clouds, windy		same boat as previous week
Windy Point	1157			1		G	12	few clouds, windy		fish jumping
Butternut	1200	1				G	13	few clouds, breezy	one camper	metal boat present

P/W AERIAL BOAT COUNTS - 2002 **FLIGHT #16**

Date: August 17

Day of Week:	Sat		Sun
Day Type:	Weekend		Long Weekend

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	1001					G	12	few clouds		
Dina #7	1009					G	13	few clouds		
Dina #3	1011					G	13	few clouds		
Dina #2	1013					G	13	few clouds		
Dina #1	1014	2		1		G	13	few clouds	5	
43 Mile	1022		2			G	13	clear		
Canty	1033					G	8	clear		
Little Carbon	1054					G	8	high broken		
Carbon	1056	2				G	10	high broken		
Wright	1100			1		G	10	high broken		
Pete	1110					G	10	high broken		
Simpson	1124			2		G	9	high broken	2	road open
Heart	1134			2	2	G	12	high broken	3	
Azouzetta	1140	1		2	1	G	12	few clouds	1	
Bruce	1150			1		G	14	few clouds	1	
Windy Point	1153			2		G	14	few clouds		
Butternut	1157					G	15	few clouds		

P/W AERIAL BOAT COUNTS – 2002 **FLIGHT #17**

Date : August 25

Day of Week: Sat | Sun

Day Type: Weekend | Long Weekend

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	1002					F	16	overcast,windy		
Dina #7	1008					F	18	broken windy		
Dina #3	1011					F	18	broken windy		
Dina #2	1012					F	18	broken windy		
Dina #1	1013	2		3		F	18	broken windy	4	
43 Mile	1018					F	17	broken windy		
Canty	1030					F	14	scattered,windy		
Little Carbon	1050					G	16	clear		
Carbon	1052					G	20	clear	1	
Wright	1058					G	19	clear,windy		
Pete	1105					F	20	clear,windy		
Simpson	1119	3	2			F	19	scattered,windy	2	
Heart	1124			2		F	19	broken windy	3	
Azouzetta	1130			4		F	19	broken windy	3	
Bruce	1142			1		F	18	scattered,windy		
Windy Point	1144			2		F	18	scattered,windy		
Butternut	1150					F	19	scattered,windy		

P/W AERIAL BOAT COUNTS - 2002 **FLIGHT #18**

Date: September 1

Day of Week: Sat | Sun

Day Type: Weekend | Long Weekend

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	1004					G	12	few clouds		
Dina #7	1012					G	12	broken clouds		lots of fish jumping
Dina #3	1014					G	12	broken clouds		lots of fish jumping
Dina #2	1016					G	12	broken clouds		lots of fish jumping
Dina #1	1018	4		1		G	12	broken clouds	6	lots of fish jumping
43 Mile	1025					F	12	overcast		
Canty	1040					F	8	overcast		
Little Carbon	1059					F	10	few clouds		
Carbon	1102			1		F	12	few clouds	1	
Wright	1106					F	12	few clouds		whitecaps on lake
Pete	1112					G	13	few clouds		
Simpson	1127	1		1		F	8	broken clouds	1	very windy
Heart	1131	1	1	2		F	14	broken clouds	4	
Azouzetta	1141	2		5		F	13	broken clouds	4	
Bruce	1153					G	14	broken clouds		windy
Windy Point	1155			1		G	14	broken clouds		
Butternut	1159	1				G	15	broken clouds	1	

P/W AERIAL BOAT COUNTS - 2002 **FLIGHT #19**

Date : September 14

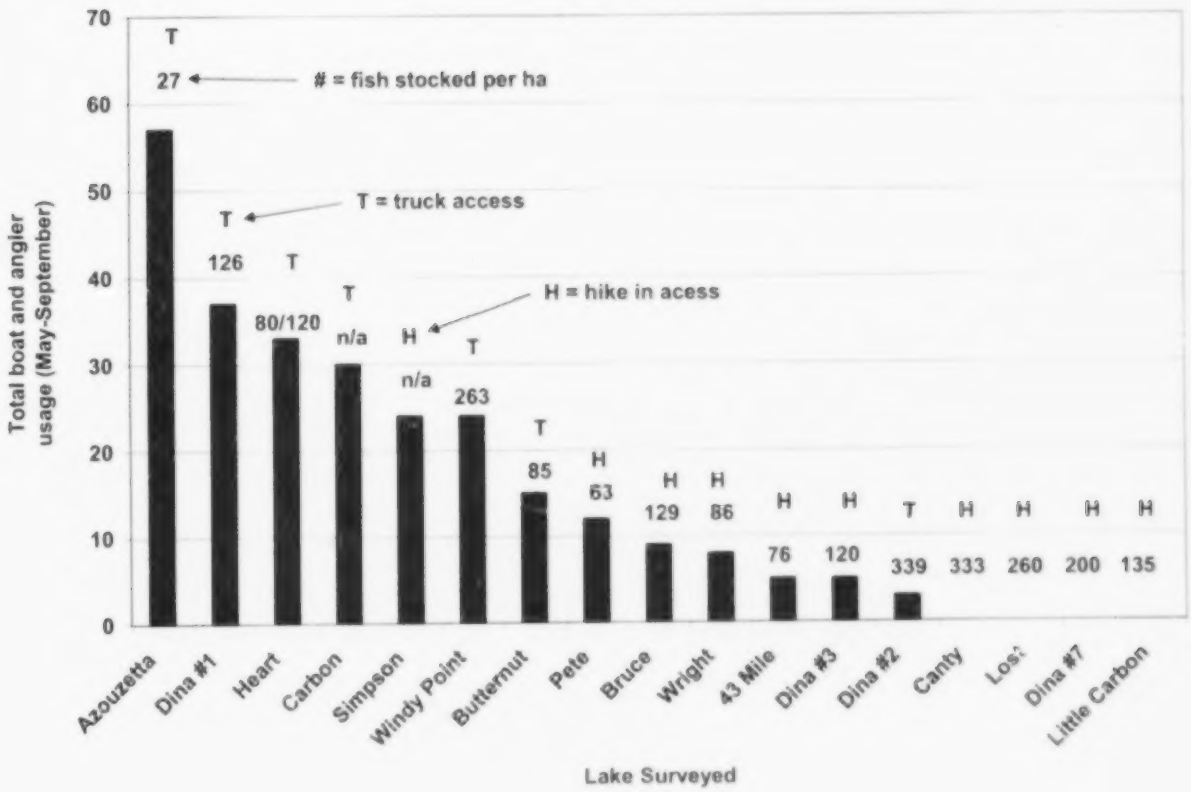
Day of Week: Sat Sun

Day Type: Weekend | | Long Weekend

Lake Name	Time at Lake	Lake Boats	Belly Boats	Shore Boats	Shore Anglers	Weather Rating	Air Temp.	Weather Conditions	Campers Present	Comments
Lost	1004					G	13	broken		
Dina #7	1011					F	13	overcast,windy		
Dina #3	1012					F	13	overcast,windy		
Dina #2	1014					F	13	overcast,windy	2	
Dina #1	1015					F	13	overcast,windy		
43 Mile	1019					F	12	overcast,windy		
Canty	1029					F	10	overcast,windy		
Little Carbon	1048					G	10	broken		
Carbon	1051			1		G	12	broken	1	
Wright	1057					G	12	broken		
Pete	1104					G	13	broken		
Simpson	1126			1		G	13	broken	1	
Heart	1129					G	13	broken	2	
Azouzetta	1132			3		F	13	overcast,windy		
Bruce	1142			1		F	16	overcast,windy		
Windy Point	1145			1		F	16	overcast,windy		
Butternut	1150					F	16	overcast,windy		

Appendix 3

Effort versus Access and Average Fish Releases


70
60
50
40
30
20
10
0
Total boat and angler usage (May-September)
T
27
# = fish stocked per ha
T = truck access
H = hike in acess
T
126
T
80/120
T
n/a
H
n/a
T
263
T
85
H
63
H
129
H
86
H
76
H
120
T
339
H
333
H
260
H
200
H
135
Azouzetta
Dina #1
Heart
Carbon
Simpson
Windy Point
Buttermut
Pete
Bruce
Wright
43 Mile
Dina #3
Dina #2
Canty
Dina #7
Little Carbon
Lake Surveyed